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Fresh Take On Trade

Ralph Gomory's storied research career has taken a new turn with theories about global commerce that serve as an intellectual underpinning for the “free and fair” commerce arguments.

by Steven B. Weiner



Photos by Jordan Hollender

Ralph E. Gomory is barely known by anyone in the metals industry. But there's little doubt that this pioneering mathematician, former senior executive of IBM and now president of the Alfred P. Sloan Foundation has influenced the debate on global trade and China.

That's because Gomory, who among other things is known as the inventor of the arcane but highly valuable concept of integer programming, has in recent years turned his analytical powers to consideration of one of the most embedded ideas of modern economics: the supposed endless benefits of free trade.

As the metals industry looks for allies in the long struggle to maintain a healthy North American manufacturing base, Gomory may be just the man. Mainstream economists suggest that in the aggregate, it doesn't matter if factories close as production shifts to low-cost manufacturing centers in China and elsewhere in Asia. Such production, they say, will always move to where products, especially less-complicated products, can be made for less. Displaced workers will be retrained or move to other jobs as the United States and Canada retain production of higher-margin, value-added products that the low-cost centers can't make.

But Gomory believes mainstream trade theory, which originated more than 200 years ago, is simply wrong. Free trade, he says, can easily hurt North American manufacturing and he's worried it may be too late to retain manufacturing primacy and the many benefits of it.

As such, Gomory is an intellectual leader among economists and others who argue that the pace of development in competitor nations can be so accelerated by today's instant communications and rapid transportation that they quickly become sophisticated manufacturers and formidable adversaries. He has worked to raise the profile of trade

issues and has advised senior Democrats as they develop policies that may reduce the nation's huge and growing trade deficit.

Many of the ideas that frame traditional economic thinking were first expressed in the British Isles in the 1700s and early 1800s. It was Adam Smith, a Scot, who in 1776 published his cornerstone work, "The Wealth of Nations," in which he wrote one of the most famous ideas in economics: that in the pursuit of self-interest, an "invisible hand" guides each person in his or her work to promote the common economic good. This and the many other ideas expressed in "The Wealth of Nations" are regarded as the principles and justification for capitalism.

Similarly, Londoner David Ricardo, who was born four years before "The Wealth of Nations" was published, is regarded as a founding father of the theory of beneficial free trade. Ricardo argued that a nation will export goods that it is relatively more efficient at making than other nations. It is a nation's "comparative advantage" and specialization that lead to trade beneficial to both trading partners.

Ricardo's analysis, new in the late 1700s and early 1800s, remains today's bedrock economic principle. As factories have shut down, and manufacturing—and now services—have marched offshore, traditional economists consistently remain sanguine. If China has a comparative advantage in making, say, computer parts, kitchen tools, vacuum cleaners, furniture, clothing, bicycles or steel, the benefits nonetheless accrue to those of us in North America who enjoy lower prices for these goods. We, in turn, will do well making those things for which we have a comparative advantage, such as, say, Boeing airplanes.

Knowledge Transfer's Startling Results

This brings us back to 78-year-old Gomory who, as a mathematician, is not imbued with economic orthodoxy. After more than a decade of study, debate and computation with an old friend, New York University economist William J. Baumol, Gomory reached two significant conclusions. They are discussed at length in their book, "Global Trade and Conflicting National Interests," published in 2000 by The MIT Press.

First, Gomory says, there is a "fundamental divergence" in the interests of multinational companies, which benefit from the comparative advantages of other countries, and the interests of their home nation.

"What a company wants is profits, and what a country wants is more GDP," Gomory said in a recent discussion in his New York office. "With the coming of globalization, a company can be very profitable by building its plants abroad, importing into the United States and using cheap labor. At that point, they are no longer adding to the U.S. GDP; they're adding GDP to some other part of the world. The goals of the country and the goals of the company are no longer linked."

This conclusion has been exacerbated by the great size and complexity of global enterprises, in sharp contrast to the relatively small size and simplicity of many goods in

IT WAS HIS IBM EXPERIENCE, HOWEVER, THAT ALERTED GOMORY TO THE RAPID SPREAD OF SOPHISTICATED TECHNOLOGIES IN ASIA, SPECIFICALLY IN JAPAN.

THE FOUNDATION PROVIDES FUNDING IN THE AREAS OF SCIENCE, TECHNOLOGY, GLOBALIZATION, ECONOMICS AND "THE KNOWN, UNKNOWN AND UNKNOWNABLE."

Ricardo's day. In the classic, often-mentioned example of England trading textiles with Portugal in return for Portuguese wines, both sides had a comparative advantage, conferred by geography, that the other could not achieve.

In today's world, however, local advantages of weather, topography or basic skills are not significant because intellectual capital—basic but essential know-how—is the prerequisite for production. Coupled with rapid and reliable transportation, knowledge transfer leads to startling results. China, for example, is not rich in iron ore, yet it is by far the world's top producer of steel. You can't build an auto industry by making cars in your backyard, but China, with a liberal assist from incautious U.S. automakers, has learned to make millions of automobiles a year.

Just look at General Motors, which has built a leading share of the Chinese car market through its partnership with Shanghai Automotive Industry Corp. (SAIC). GM's Buick line is weak in North America, but it's doing well in China. But also doing well is now well-educated SAIC, which is launching its own auto brands that will compete with GM, as well as independent car producer Chery with its popular QQ minicar.

Inside and out, the QQ reminds GM—and everyone else—so much of GM China's Spark minicar that the Detroit company sued Chery over apparent product piracy. Chery's production partner for the QQ? It's Shanghai Automotive Industry Corp. The case was settled after China's intellectual property authorities ruled that the Spark design was never patented in China and thus wasn't protected there. Chery has agreed, however, not to sell its cars in the U.S. under the Chery name, which to GM sounds a lot like its brand, Chevy.

Or take the experience of Santa Clara, California-based Intel Corp. A participant in the Chinese market for more than two decades, Intel this March announced construction of a \$2.5 billion silicon wafer fabrication facility in Dalian, Liaoning Province, its first greenfield plant since 1992. One month later, Intel announced expansion of its Multi-core University program to 37 universities in China "to cultivate the next generation of multi-core developers for the global IT industry." The possibility of U.S. engineers developing multi-core technology seems to be ruled out by these Intel news releases, which provide no company address or any other form of U.S. identity.

Foreign trade, Gomory and Baumol found, is beneficial to both sides only when a developed nation establishes its first relationships with manufacturers in an undeveloped country. Inevitably, they say, continuing trade leads to conflicting national interests in which the primary benefactor is the developing nation, not the developed nation that yields up precious intellectual capital to extract short-term economic gains.

Equally important is Gomory's second major point. "Globalization should not be confused with free trade," he says. "Free trade is not globalization, and globalization is not free trade. People try to use the known virtues of free trade and say that they apply to globalization, but that's a misunderstanding of what economic theory has to offer. Free

trade occurs when you trade in finished goods, not when you give away things needed to enhance productivity.”

To explain, Gomory puts it this way: In theoretical terms, globalization consists of free trade and a second major factor, “changes in the ability of countries to produce various goods and services.” In other words, as globalization ensues, underdeveloped trading partners become more sophisticated and capable, and as they do, they begin to make new and often more valuable products at very competitive prices.

Intel, for example, sees China as more than an assembly plant. It seeks, instead, to pass along its intellectual capital to Chinese employees who will innovate to develop entirely new products—new products that previously were designed and built in the U.S. This makes China stronger and the U.S. comparatively weaker. Intel was asked to comment on this contention but did not respond.

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“A major feature of globalization—in fact, probably the most important feature—is the emergence of new capabilities,” Gomory says. “There is no standard theory of trade that says the emergence of new capabilities in your trading partners is good for you. Nor can there be, because if you take the standard models and make changes in the parameters that represent the capabilities, you will find that some changes are quite damaging.”

So damaging, in fact, that Gomory and Baumol found “it is easy to construct examples, very sensible ones, in which the emergence of new capabilities in your trading partner has a harmful effect on your overall standard of living, and not just on the affected industries,” Gomory says.

He declines to apply these findings to any particular trading partner because he says he and Baumol were investigating whether Ricardo’s ideas about comparative advantage really do hold up in today’s global trade environment. Gomory’s theories, in other words, are just that—theories—just as Ricardo’s ideas were theoretical constructs that attempted to explain trade from the point of view of the emerging British Empire.

But here in the real world, many of Gomory’s ideas have been incorporated into The Horizon Project, a provocative manifesto about U.S. competitiveness produced by a small group of largely retired business executives to help shape the thinking of the new Democratic majority in the Senate. Gomory is a signatory to the report, which was delivered to the Senate on Feb. 1.

Reward U.S. Investments

“I’m not against free trade, provided that it’s fair trade,” says Leo J. Hindery Jr., Horizon

← THE NOTION THAT ALL OF US JUST DOING INNOVATION IS A WAY OUT IS NOT CORRECT. R&D, IN THE END, HAS TO TRANSLATE INTO SOMETHING THAT PEOPLE WILL PAY FOR. —RALPH E. GOMORY

Project chairman, former CEO of AT&T Broadband and TeleCommunications Inc., and now a private equity fund managing partner in New York. “Our job losses in America have occurred because of illegal government-assisted behavior on the part of our trading partners.”

Horizon recommends that Congress take steps to improve competitiveness in four broad areas, including education, health care, public infrastructure and, most important, trade and economic policy.

“Globalization ... has made it possible for many U.S. multinational corporations to pursue their interests by building capabilities abroad, which use low-cost labor, and then import the generated goods and services into the United States,” the report says. “In doing this, they are certainly fulfilling their fundamental purpose of enabling people to participate in today’s high-value jobs, but increasingly in the process, they are building up the capabilities of the emerging Asian states and reducing the capabilities of the United States.”

Among many other things, the report suggests an altered corporate tax structure to include a value-added tax; a business activity tax with the rate adjusted on a sliding scale to reward companies that maintain high-value jobs and manufacturing in the U.S.; elimination of tax deferments for foreign profits; changes to the rules that govern how a company may allocate expenses to foreign subsidiaries; and a required national security impact statement for planned offshore manufacturing that might reduce national defense capabilities.

It’s worth noting that at least some Horizon participants think in radical terms about some of these ideas. For example, one line of thought about the trade deficit is that imports might eventually be restricted to match exports. Heavy exporters would be granted licenses to import a like value of any good, and those that did not need those import licenses could sell them to companies that do need them.

Equally strong medicine has been discussed for the suggested sliding rate for corporate taxes, with heavy importers that provide primarily low-wage jobs, such as discount retailers, paying comparatively high tax rates, while heavy exporters with highly paid jobs would pay very low tax rates. This approach, even if phased in, would strongly encourage exports, greatly discourage imports and change the entire face of the U.S. manufacturing sector.

“The Horizon Project is a very helpful addition to public discussions,” says Sen. Byron L. Dorgan (D-North Dakota), who chairs the Senate Democratic Policy Committee. “Its recommendations include suggestions that are both thoughtful and constructive.”

Gomory doubts whether two often-discussed solutions to the competitiveness problem—an improved education system and an expectation of continued technological innovation—are the answers for reversing the manufacturing drain to Asia.



“There’s a great deal of discussion about innovation, the post-industrial economy and the knowledge-based economy,” he notes. “I think we should look very hard at how real that is. The idea that there is always lurking in the wings something new and better for the American people to do is mere speculation.”

At the same time, he notes, our global competitors also are developing their innovation skills, very often assisted by multinationals that base R&D centers near their off-shored manufacturing facilities. Innovative products developed overseas will, in all likelihood, be manufactured overseas as well.

“The notion that all of us just doing innovation is a way out is not correct,” Gomory says. “R&D, in the end, has to translate into something that people will pay for.” And something that people pay for usually has to be made.

Look to Singapore

Better education can certainly help, Gomory believes, but a reliance on better education is misplaced. “America became a rich country not primarily because of better education, but because our workers dug ditches with backhoes when many other equally intelligent people in other parts of the world were using shovels,” he says. “In other words, our corporations equipped American workers and made them productive far beyond many other foreign workers.”

But all that’s changed with globalization. “Now, you’re just as likely to have a Chinese or Asian worker with the same backhoe as an American,” he says. “In that environment, it’s very hard to win with education when the person you’re competing with will accept a quarter of your wage.”

Sounding, no surprise, somewhat like the Horizon Project’s recommendations, Gomory suggests two areas for consideration: one focused on external factors, the other on internal ones. Externally, we might take steps to require trading partners to follow all of the international rules of free trade while avoiding such distortions as currency manipulation. “When we claim the advantages of free trade, we need to do so in a free trade environment,” he notes.

→ GOMORY SAYS CONTINUING FOREIGN TRADE LEADS TO CONFLICTING NATIONAL INTERESTS IN WHICH THE PRIMARY BENEFACITOR IS THE DEVELOPING NATION.

Internally, he suggests, steps to eliminate the trade deficit and reward exporters could be beneficial. He suggests that the small nation of Singapore provides an interesting example of a country that offers manufacturers a simple proposition. Singapore, which bills itself as “the world’s most business-friendly nation,” aggressively seeks new enterprises with dozens of programs to provide loans, tax breaks, low-cost rent, longer-term financing, help with branding, grants to hire consultants, legal assistance, help

finding directors and advisors, and even money to help companies find customers overseas.

“From a company’s point of view, their proposition is very good,” Gomory says. “They say, ‘We want GDP, you want profit. So come, you’ll make a profit here, and you’ll add to our GDP. OK, it’s a deal.’

“The question is, can we say that to our own companies? At this point, we’re not trying to. Assisting individual companies is not part of our tradition. But don’t forget, the other guys are doing it, and they seem so mysteriously to make it work.”

Who is Ralph Gomory?

Ralph E. Gomory easily and naturally exists in the rarefied world of advanced mathematics and, at the same time, in the hustle and hurry of big business.

He is known professionally for his invention of a particularly difficult branch of mathematics, integer programming, which is broadly applicable in business, economics, computer operations and many other fields to optimize the use of complex sets of resources. For example, integer programming helps airlines determine the most efficient, lowest-cost way to schedule flight crews given the complex requirements of union and government work rules, cities served, flight times for each leg flown and aircraft availability.

Born in 1929 in Brooklyn Heights, New York, Gomory was drawn to mathematics because “mathematical models help me to think about things that either I have a practical need to understand or I am just plain curious about.” He earned a Ph.D. in mathematics from Princeton University in 1954 with a thesis on nonlinear differential equations, a realm of study important to engineering, physics and economics, among other applications.

He served as an officer in the U.S. Navy for the next three years, assigned to the Physics Branch of the Office of Naval Research. It was during this period that he became interested in operations research, or the science of using advanced analytical methods to make better decisions in complicated business environments.

Gomory moved from the Navy to Princeton University, where he was an assistant professor of mathematics and started to develop ways to eliminate the non-integer solutions that the existing mathematical methods gave for some real-world problems, such as how best to schedule the movements of aircraft carriers to provide maximum aerial support for Navy military operations.

Mathematical solutions that recommended, say, stationing tenths of an aircraft carrier in a particular area clearly don’t work when the entire ship is necessarily required. While at Princeton, Gomory befriended another young professor, economist William J. Baumol.

Their first paper together, which linked integer programs and pricing, was published in 1960. They would not publish another joint paper until more than 30 years later.

Gomory joined the research division of IBM in 1959 and became director of its Mathematical Sciences Department in 1965. He became IBM's research director in 1970 and senior vice president for science and technology in 1986. He retired from IBM in 1989 at the mandatory age of 60.

It was his IBM experience, however, that alerted Gomory to the rapid spread of sophisticated technologies in Asia, specifically in Japan. Every five years, as part of negotiations for new cross-licensing agreements, Japanese electronic companies would review IBM's advances, while IBM executives toured Japanese plants to see their best work.

"Every five years, I was in a position to see the changes, and they were really, really impressive," Gomory recalls. "I thought, 'Well, we're getting some very formidable competition here.'"

In one instance, a Japanese company that had done very little in semiconductor manufacturing displayed "the most beautiful pilot line you ever saw" during a subsequent IBM inspection tour. Because semiconductor production is not easy to begin, Gomory believed the Japanese government had adopted policies to assist such companies. "It's a business that moves very fast, and it calls for huge investments," he says. "But if you have a government backing you, you can get into it. What I was seeing is different from what I would hear about from economists, and I decided then that once I retired, I would look into it."

Gomory found an excellent place to look into things. He became president of the Alfred P. Sloan Foundation in New York, a philanthropy established in 1934 by the former longtime chairman and CEO of General Motors. Among other things, the foundation provides funding in the areas of science, technology, globalization, economics and "the known, unknown and unknowable."

By then, his old friend Baumol had become as distinguished in economics as Gomory was in mathematics. With a Ph.D. from the University of London, Baumol was an economics professor at New York University and also at Princeton. He had been awarded honorary degrees from academic institutions in the U.S., Europe and South America. Gomory, too, received a number of prestigious awards, some recognizing his work in mathematics. In 2005, he was named to the Operational Research Hall of Fame by the International Federation of Operational Research Societies, an umbrella organization for national research societies.

Between 1992 and 2000, Gomory and Baumol collaborated on nine economics papers on Ricardo's trade theories, industrial policy, productivity, linear trade models, scale economies and national conflicts caused by productivity changes. Those papers led to their book, "Global Trade and Conflicting National Interests."

“I was no economist, but one of the reasons I thought I could probably do something in this area is because the mathematics of integer programming deals with exactly what you need to deal with economies of scale or industries that are difficult to enter,” Gomory says. “You can’t compete with General Motors by building a car in your backyard, but that’s what most economic models assume you can do. They have linear production functions, which means that if you put a little bit in, you get a little bit out. If you put twice as much in, you get twice as much out. That’s a standard assumption of these models, but that’s not quite right for the real world.”